5/3/18

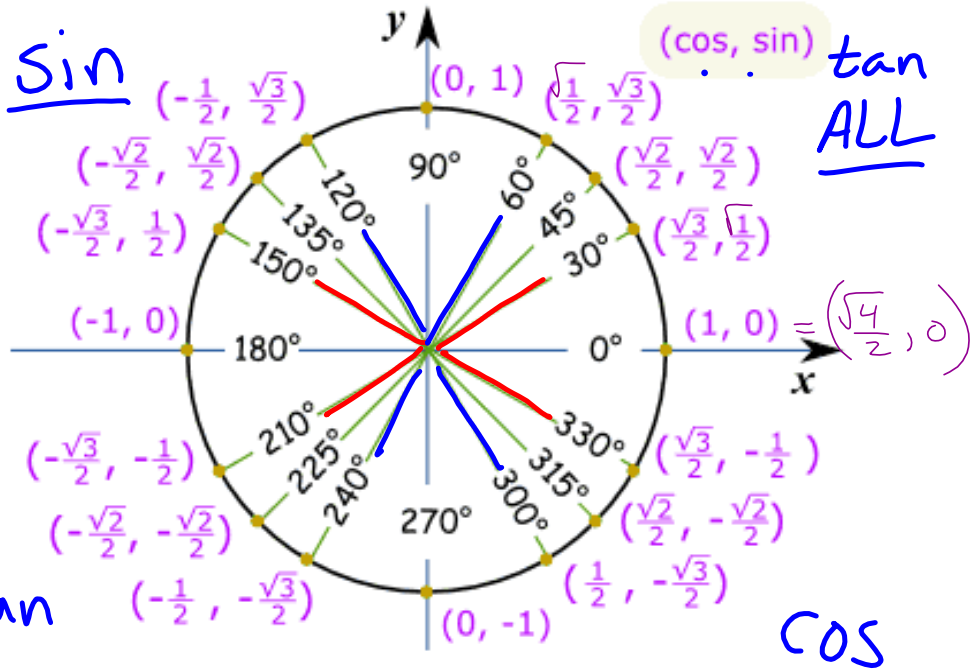
"If you continue to look at the past, you're focusing on the wrong direction."-Dennis Black

HW: "Reciprocal Trig Functions" homework section

AIM: What are other Trigonometric Functions?

Warm Up:

Fill in the Unit Circle with the angles and coordinates



	0	30	45	60	90
sin	$\frac{\sqrt{0}}{2}=0$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{4}}{2}=1$
cos	$\frac{\sqrt{4}}{2}=1$	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{1}}{2}$	$\frac{\sqrt{0}}{2}=0$
tan	0	$\frac{1}{\sqrt{3}}$	1	$\frac{\sqrt{3}}{1}$	und.

Reciprocal functions

THE OTHER 3 TRIGONOMETRIC FUNCTIONS

1. **SECANT:** $\sec(\theta) = \frac{1}{\cos(\theta)}$

2. **COSECANT:** $\csc(\theta) = \frac{1}{\sin(\theta)}$

3. **COTANGENT:** $\cot(\theta) = \frac{1}{\tan(\theta)}$ or equivalently $\cot(\theta) = \frac{\cos(\theta)}{\sin(\theta)}$

***Exercise* #1:** Considering your work with sine and cosine, evaluate each of the following. Express your answers in exact and simplest form.

(a) $\sec(60^\circ)$

cos 60 flipped

$\cos(60) = \frac{1}{2}$

Sec 60 = $\frac{2}{1}$

(b) $\cot(150^\circ)$

$\tan(150) = \frac{\frac{1}{2}}{-\frac{\sqrt{3}}{2}}$

$\tan(150) = \frac{1}{-\sqrt{3}}$

$\cot(150) = -\sqrt{3}$

(c) $\csc\left(\frac{3\pi}{4}\right)^\circ$ $\frac{45}{\frac{180}{\pi}}$ $= \csc(135)$

$\sin(135) = \frac{\sqrt{2}}{2}$

$\csc(135) = \frac{2}{\sqrt{2}} \cdot \frac{\sqrt{2}}{\sqrt{2}} = \frac{2\sqrt{2}}{2}$

$= \sqrt{2}$

***Exercise* #2:** Which of the following is closest to the value of $\sec(52^\circ)$?

(1) 0.62 (3) 0.36

(2) 1.62 (4) 2.48

$\sec 52 = \frac{1}{\cos 52} = 1.62$

Because each of these reciprocal trigonometric functions has a variable denominator, there will be angles at which these denominators are zero and hence the function is undefined.

***Exercise* #3:** Which of the following values of x is ~~not~~ in the domain of $y = \csc(x)$?

(1) $x = 180^\circ$ (3) ~~$x = 90^\circ$~~

(2) ~~$x = 60^\circ$~~ (4) ~~$x = 135^\circ$~~

$\csc(x) = \frac{1}{\sin(x)}$

which x makes csc(x) undefined

Sin/csc | ALL
Tan/cot | cos/sec

Because each of these functions is dependent on sine and/or cosine, it is possible to determine the **sign** (positive or negative nature) of each based on the quadrant of the input angle.

***Exercise* #4:** Determine the sign of each of the following trigonometric functions in the quadrant specified.

(a) $\cot(\beta)$ for β in quad. II (b) $\sec(\beta)$ for β in quad. IV (c) $\csc(\beta)$ for β in quad. III

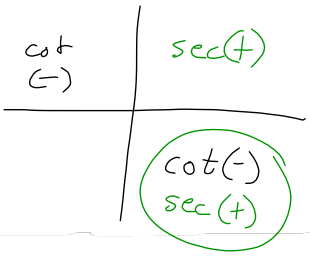
Negative Positive negative

***Exercise* #5:** If $\cot(\theta) < 0$ and $\sec(\theta) > 0$ then θ could be which of the following angles?

neg pos

(1) $\theta = 48^\circ$ (3) $\theta = 122^\circ$

(2) $\theta = 310^\circ$ (4) $\theta = 225^\circ$



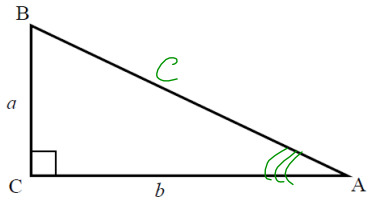
We should also be able to produce all of the trigonometric ratios (all SIX of them) if we are given a right triangle.

***Exercise* #6:** A right triangle is shown below with sides of length a and b.

(a) Find the length of the hypotenuse in terms of a and b. Label on the diagram.

$a^2 + b^2 = c^2$

$\sqrt{a^2 + b^2} = c$



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(b) State the value of each of the following trigonometric ratios in terms of the constants a and b. ; c

$\sin A = \frac{a}{c}$ → $\csc A = \frac{c}{a}$

$\cos A = \frac{b}{c}$ → $\sec A = \frac{c}{b}$

$\tan A = \frac{a}{b}$ → $\cot A = \frac{b}{a}$

***Exercise* #7:** If α is an angle whose terminal ray lies in the fourth quadrant and $\cos\alpha = \frac{1}{3}$, then determine the exact value of $\csc\alpha$. Show how you arrived at your answer.